

REMARKS/ARGUMENTS

Brief Review of the Office Action

The Examiner allowed claims 7-22.

The Examiner rejected claims 1-6 under 35 U.S.C. §103(a).

Summary of the Response

Claims 1-6, as amended are presented for reconsideration and further examination in light of the following remarks. No new matter has been added; support for the amendments and the new claims is found throughout the application

Amendments to the Specification

Amendments to the specification have been made to correct clerical errors. No new matter has been added.

Rejections Under § 103

In the outstanding Office Action, claims 1-6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kremen (U.S. Patent 6,229,562). Applicant respectfully traverses this ground of rejection.

Generally, applicant's claim 1 is directed to a laser projection system that includes a Laser-CRT, a film delivery system that advances film over an aperture that is illuminated by the Laser-CRT, and projection optics that project a film image on a screen. The Examiner's rejection is based solely upon the Kremen reference, which discloses a three dimensional image projection system that utilizes holographic film. Applicant has amended claim 1 to claim non-holographic film.

The Examiner has found no references that suggest the suitability of any laser source for illuminating conventional, non-holographic film (and certainly not a laser-CRT). The Kremen reference discloses a holographic system including one or more lasers that illuminate holographic film in a projection system. Conventional film projectors typically use a white source of light such as a xenon arc lamp. Film projectors were developed long before lasers, and arc lamps have been used for many years to illuminate film. It would not have been obvious to use laser light to illuminate non-holographic film for a variety of reasons, such as the complexity of conventional laser systems, difficulty in controlling the beam intensity over the

entire film aperture, and huge cost difference. There would have been no motivation to use lasers: the arc lamp technology provided a simple, low cost solution to the problem of providing light to illuminate film, and it would not have been obvious to substitute a much more complex and expensive conventional laser system. For example, the monochromatic nature of lasers requires at least three lasers to create a full color image – a red laser, a green laser, and a blue laser and furthermore, beam combining components are required, all to replace a single arc lamp.

Laser display systems (such as disclosed in the specification with reference to Figs. 2 and 3) have been developed as an alternative to film projection system; specifically, development of prior art laser display systems has followed a path that proposes elimination of film altogether. Conventional laser display systems utilize one or more lasers that generates one or more laser beams, and include a modulation system, such as a spatial light modulator, to modulate the beams. The modulated light is then combined and projected onto a screen; some systems scan the laser beams across the screen, other systems display the beam directly, without scanning. Laser display systems are digital (the field is sometimes called "digital cinema"), and therefore propose to eliminate film and replace it with digital data. Regardless of the type of laser display system, design efforts for laser displays are directed toward making better and more efficient modulators, optical components, beam delivery systems, and so forth. In the field of digital cinema, there would have been no motivation to use a laser system to illuminate the conventional film targeted for elimination.

In claim 1, applicant claims a projection system that includes a Laser-CRT, which is a device has significant advantages over conventional lasers for illuminating film. A Laser-CRT is described in the specification for example at page 13 line 18 *et seq*; briefly, a Laser-CRT includes a laser screen that emits a laser beam in response to pumping by an electron beam. In operation, the electron beam scanned across the screen in the manner of a conventional CRT to generate a laser beam from each pixel. A Laser-CRT generates an area output that can be precisely modulated and carefully and quickly controlled to provide a desired area output with a desired intensity distribution. Using conventional lasers, a controllable area output could theoretically be provided by external modulators, but such a system is difficult to create, expensive to build and operate, and highly sensitive to changes in the environment.

Furthermore, Laser-CRTs are much less expensive, make more efficient use of electrical energy than conventional lasers, operate cooler, and consume less space.

Claims 2-6 depend upon claim 1 and therefore patentability of those claims follows; however, applicant will discuss claims 2 and 3 for completeness.

Claim 2 claims a system in which the Laser-CRT is synchronized with the film so that the film is illuminated only when in the aperture, which provides advantages such as efficient operation, less heat generation, and longer device lifetimes. This synchronization is made possible by the fast modulation inherent in the Laser-CRT, requires no additional components, and the shutter can be eliminated. As stated in the specification:

In other embodiments the laser source may be electronically controlled so that it does not illuminate the aperture during the time during which the film is moving (such as by direct or indirect modulation, or simply turning it off) using a synchronization system, and furthermore the laser source may be electronically controlled to prevent the appearance of flicker. In such embodiments, electronic control replaces the function of the shutter, and therefore the shutter can be eliminated.

[Specification, page 12, lines 3-9]

In conventional film systems, the arc lamp is operated continuously. In the claimed system, the Laser-CRT is synchronized (turned on and off) with the film aperture. Although in general the principle of using flashing light on moving film to create the appearance of motion is not new, applicant claims a system in which the Laser-CRT is controlled to illuminate the aperture only when the film is stopped, which advantageously prevents flicker and allows elimination of the conventional shutter. It may be noted that most conventional lasers (with the exception of semiconductor lasers) cannot be easily turned on and off in short time intervals; accordingly such conventional lasers would not be suitable for a synchronized system without the use of external shutters or modulators.

In claim 3, applicant claims a system including a color temperature control system for selecting the color temperature of the Laser-CRT system. For example, in embodiments where multiple laser-CRTs are used each having a different color, each of the the laser-CRTs can easily

be selected individually and controlled to provide a desired color temperature. This has advantages such as described in the specification:

In some embodiments, the color temperature of the light illuminating the film can be selected by using a color temperature control system to increase and/or decrease the relative light intensity contribution of each of the lasers. The ability to select color temperature could be useful, for example, to allow a filmmaker the artistic freedom to select a color temperature for illuminating the film, or different color temperatures for different parts of the film. Furthermore, the viewing experience would be consistent for all viewers because the color temperature would be closely controlled. In summary, the ability to control color temperature provided by color temperature control system allows color flexibility for filmmakers, while providing color consistency for moviegoers.

[Specification, page 5, line 19 to page 6, line 5]

Such a system, in which the color temperature of the film illumination can be selected, is simply not possible with conventional film projectors. Furthermore, such a system is neither disclosed nor suggested by Kremen.

Therefore the references, taken separately or in combination, do not fairly teach or suggest applicant's claimed invention.

In view of the foregoing, applicant respectfully requests withdrawal of the rejections under § 103.

CONCLUSION

Applicant has addressed all of the Examiner's objections as expressed in the outstanding Office Action, and accordingly requests allowance of all pending claims.

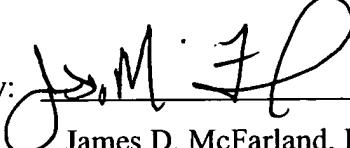
If the Examiner finds any remaining impediment to the prompt allowance of these claims that could be clarified with a telephone conference, the Examiner is respectfully requested to initiate the same with the undersigned.

In the event that additional fees are required or credit is due, authorization is hereby given to charge Deposit Acct. No. 50-0948.

Respectfully submitted,

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